

WPS3019

**Foreign Aid, Conditionality and Ghost of the Financing Gap: A Forgotten Aspect of
the Aid Debate**

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DEC DG

World Bank Policy Research Working Paper 3019, April 2003

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¹ Thanks are due to Michael Lewin and Nina Budina (World Bank) and Sarath Rajapatirana (American Enterprise Institute) for helpful comments.

Abstract

The World Bank publication “Assessing Aid: What Works, What Doesn’t, and Why” generated a new wave of controversy about foreign aid and policy conditionality that had seen several decades of intense debate. Much of the recent debate has focused on the aid-growth relationship and the role of “good” policies. While a great deal has been said about qualitative aspects of aid-effectiveness (i.e. fungibility, among other things), little attention has been paid so far to some important quantitative aspects. The present study draws attention to this neglected aspect of the aid debate to demonstrate that the level of aid requirements of a country is an equally important and integral part of aid and aid-effectiveness. The World Bank/IMF approaches to estimation of external assistance requirements of a country in quantitative terms is compared with an alternative model, the so-called “Balance of Payments Constrained Growth Model” (based on the Harrod trade multiplier). It is revealed that the latter is not a real alternative as it is an incomplete model. More importantly, it is shown that international financial institutions use these quantitative frameworks in a very flexible and pragmatic way to carry on a meaningful policy dialogue with both donors and recipient countries, which has an important bearing on aid-effectiveness.

Introduction.

The publication by the World Bank entitled “Assessing Aid: What Works, What Doesn’t, and Why,” (see, The World Bank, 1998,) has generated a great deal of debate among, academics, professional economists, and policy makers.² The World Bank report asserted that aid does help to increase growth in countries with sound economic management. The main message of the report both to aid recipients as well as donors was that aid should be allocated to recipient countries in accordance with their policy environments. These ideas about aid effectiveness, future of development aid, and policy conditionality associated with the new approach to aid have come under considerable criticism (see for example, Dalgaard and Hansen (2001), Doornbos (2001),Guillaumont and Chauvet (2001), Hermes and Lensink (2001), Hoeven (2001), Hansen and Tarp (2000), Lensink and White (2000).

One aspect of this debate that has not received a great deal of discussion until recently relates to the question of analytical models for determining the extent of aid requirements of a country. In his study on “The Ghost of the Financing Gap: How the Harrod-Domar Model still Haunts Development Economics” Easterly (1999, see also 1997) pointed out that the Harrod-Domar model is still being used by leading international financial institutions (IMF, WB, etc) and regional agencies to measure foreign resource requirements, to allocate aid, and to provide advice to developing countries on economic policy. He observed that the Harrod-Domar model was not intended as a growth model, and was in fact repudiated by one of its authors four decades

² See also, the background studies to that report by Burnside and Dollar (1997 and 2000) and Collier and Dollar (1999)

ago. Easterly encouraged the academic/professional development community to closely evaluate the analytical models used by international financial institutions for determining foreign aid.

Picking up Easterly's challenge, in an article in the *Journal of Post-Keynesian Economics* (Fall 2001) titled "Exorcising the ghost: An alternative model for measuring the financing gap in developing countries", Nureldin Hussain (2001) presented an "alternative" approach to address "interrelated questions of how to predict growth, how to measure the financing gap, and how to allocate aid and measure its development effectiveness." Hussain stated that so far there has not been a credible alternative to the Harrod-Domar model and that this creates a dilemma for policy makers. In this view, the "dominant think tank of World Bank is now shifting from the aid-financed investment toward a new paradigm – good policies plus money," but "this new paradigm has no uniform philosophy to address the interrelated questions" of aid and development. To address such questions, Hussain advocates the use of the so-called "Balance of Payments Constrained Growth Model" of Thirlwall and Hussain (1982) – referred to as the T-H model. According to Hussain, this latter model "introduces a convenient methodology backed by a growth model to estimate resource requirements, as well as providing "new" insights with regard to the formulation of development policies and assessing the effectiveness of development assistance."

Hussain presented a very interesting form of the T-H model with actual applications for a number of African countries. While simplicity and clarity are virtues

that any user would appreciate, the T-H model, unfortunately, does not present a “credible alternative.” In part, the problem seems to emanate from the particular presentation of the T-H model: it is not a complete model. Thus, the T-H model ends up with an incomplete estimate of the financing gap. It appears that Hussain has somewhat misunderstood the so-called World Bank model and Easterly’s observations on the “ghost of financing gap”. To clarify these issues, we first begin with a very brief description of a stylized version of the “standard” model used by the World Bank for country operations work, which Easterly took to task. Second, a comparison of this “standard” version with the T-H model reveals that the latter is almost an exact copy of one of the key relationships of the former. The T-H model leaves out other key relationship such as the investment-savings gap, the fiscal gap and the monetary implications of the balance of payments. Thus, the T-H model fails to address the fundamental question raised by Easterly, and cannot be considered an “alternative”. Furthermore, it is also clear that both Easterly and Hussain have failed to appreciate how the World Bank and IMF models are used in practice: that is, how Bank/IMF economists, policy makers, and donors have used these models in a very flexible way to overcome some of their well-known shortcomings. Thus, it appears that both Easterly and Hussain are ghost-busters chasing after elusive, if not almost non-existent “ghosts.”

The “standard” framework of the “Three-Gap” model of the World Bank³

In the following paragraphs, a description of the World Bank’s model is given with the variables expressed in level terms. While this model can be given in more compact form to show its properties, we opt to give a description of the actual working model used by the country economists in the World Bank. The “standard” model used by many World Bank country management units (known as the Revised Minimum Standards Model Extended - RMSM-X) belongs to a class of “three-gap” models widely used by developing countries (see Bacha (1990), Iqbal(1997), Khan(), Sepehri, Moshiri and Doudongee (2000), Taylor(1990)) that is an extended version of the “two-gap” model introduced by Chenery and Strout (1966). It consists of two modules: the flow of funds module that sets the accounting identities and a few behavioral equations (FOF), and a external debt module that brings in information of external debt related transactions (DM). The basic version contains four economic agents or "sectors": Central Government, the Monetary System (Central Bank and Deposit Money Banks), the "Private" Sector⁴ (“Rest of the Economy” including households and private firms, non-central government agencies, parastatal enterprises, and non-monetary financial institutions) and the Foreign Sector.

Equations of the “standard” model⁵

The savings-investment gap:

³ The “standard” three-gap model has come under a great deal of criticism from World Bank economists, and there had been a number of attempts to find alternatives that are capable of handling old issues and new demands, including poverty-related work (see, Devarajan et al (1994), Agénor, et al (2000)).

⁴ The so-called ‘Private Sector’ should be interpreted as a residual sector, i.e. whatever sector the user does not specify separately will be in this ‘Private Sector.’

⁵ For the symbols used, see appendix 1.

$$Y - (C_g + C_p) - (I_g + I_p) = X - IM \quad (1)$$

The foreign exchange gap:

$$X - IM + NFY + NCT + KT_{fg} + DFI + POR + NLT + NST + dRES = GAPF \quad (2)$$

The fiscal gap:

$$\begin{aligned} NTXpg + Td + (Ti - Sub) + NCTfg + NFfg + NFgp + Krev - Ig - NKTRgp = \\ = Lmg + Lpg + KTfg + NLTfg + NSTfg \end{aligned} \quad (3)$$

The monetary sector flows are summarized by equation (4) below:

$$L_{mp} + L_{mg} + dRES = dM + dNOL \quad (4)$$

Ignoring many sectoral details, this stylized version of the model can be summarized to consist of 4 equations and 33 variables.⁶ A particular version of this consistency framework in summary form is given in the appendix 2. To obtain a numerical solution (33-4) variables should be assigned values. In this process, a number of important variables are “endogenized” by specifying several appropriate behavioral equations. Some of these are discussed below in the section on typical behavioral structure of the model. For the remainder, several different methods of exogenously specifying the expected values for the variables are adopted. These, in fact, could also be considered as sub-models depending on the degree of details accommodated.

Typical behavioral equations of the model

The money demand function:

$$M = P \cdot y / v \quad (5)$$

⁶ The 5th equation of the system, i.e. that for the private sector is redundant according to Walras' law.

The investment/output relation:

$$I(t) = ICOR(t+1) * [y(t+1) - y(t)] \quad (6)$$

Private consumption function:

$$C_p = c * (Y - T + NCTR + NFY) \quad (7)$$

Import functions:

$$IM_i = f(y_c, RER_i) \quad (8)$$

Manufacturing exports function:

$$X_m = f(y_f, RER_m) \quad (9)$$

Other exports:

$$X_i = (1+g_{xi}) * X_i(t-1) \quad (10)$$

The model can be solved using one of several approaches. First, all resource flows could be specified exogenously and the model could then be solved for the implied growth and inflation rates.⁷ Second, resource requirements (including the additional foreign exchange needs) could be estimated for given growth and inflation assumptions. Most users of the model adopt the latter approach for computational convenience. Either approach could be considered as a first step in an iterative process that converges to a feasible solution to the model.⁸

To evaluate the external sustainability of the country, a module that incorporates external debt information supplements the flow-of-funds framework. This enables the calculation of the debt servicing capacity of the country taking into account the existing

⁷ In World Bank terminology this is called the "availabilities" approach to model solution.

⁸ Since no explicit objective function is used, the solution is best described as a feasible one. The importance of iteration in this process cannot be overemphasized.

stock of external debt and changes in that stock as a result of the projected balance of payments outcomes as given by the flow-of-funds part of the model. In other words, the interaction of the information on external debt flows and the flow-of-funds facilitates the mapping of the implications of alternative profiles of aid-financing to the balance of payments.

Investment-Savings Behavior and the Calculation of “financing gap”.

For the last two decades, the Harrod-Domar specification embodied in equation (6) above had been under challenge by numerous academics, World Bank/IMF economists and other users of this type of “standard” model⁹. However, Easterly added a new dimension to that challenge by alluding to the “ghost of financing gap” by emphasizing the implications to an important outcome of the model, namely foreign aid allocation. And this important variable has also an equally significant bearing on the lending programs and policies of the World Bank/IMF, other multi-lateral and bilateral donors. After a critical evaluation of the “financing gap” model in light of growth theory, Easterly (1999) concluded that “...in the short run, there is no theoretical reason in standard neoclassical and endogenous growth models to expect the ICOR to be a measure of investment quality, to be the derivative of growth with respect to investment, or to be constant during transitions.” Considering a number of specific country experiences, Easterly (1999) then went on to assert that the “financing gap” model has little empirical validity. From a fairly rigorous viewpoint, these indeed were very valid criticisms of the type of models in question. Unfortunately, however, Easterly did not propose any

⁹ Some have in fact opted to drop the relationship between investment and growth and have instead adopted an output adjustment mechanism in the Keynesian tradition (see, Bacha, 1990 and Taylor, 1994)

alternative models that the international financial institutions could possibly use in the given context.

Comparison of “three-gap” and T-H models.

The “standard” model can easily be presented in such a way as to conform to the T-H model by appropriately aggregating variables so as to retain only those that are used by T-H. and expressing the results in growth rate form. However, by retaining the details that actually are considered within the framework of the “standard” model, we also want to emphasize the fact that a great deal of information and empirical work goes into the use of the framework than appears at first sight. For example, a function may be developed for direct foreign investment into the particular country under study or the value assumed may be based on already approved projects (such as oil pipelines, hydro-electric dams, etc) from available reports etc..

The important point to note is that by considering a subset of variables in equation (2), one can easily arrive at the result shown by the T-H model’s equation (5) in growth rate form (see, Hussain (2001)). It is clear that the sub-set of the variables considered by Hussain in his equations (2), (3), and (4) – and therefore, in the resulting equation (5) – is the sum of the current and capital account transactions of the balance of payments. Hence, of course, the origin of the term “balance of payments constrained growth.” Ignoring the richer details in the World Bank presentation, it appears that the T-H model is based on the same aggregative import/export elasticities that underpin the World Bank’s balance of payments equations. However, while focusing on the balance of

payments gap is unavoidable, it is not the same thing as asserting that the external gap is the only constraint and that it is the “dominant constraint on output growth”. In some developing countries, this may not be the case. It is precisely because of this reason that Chenery and Strout (1966) laid emphasis on the “two gap” approach and the inter-related nature of the savings-investment and foreign exchange gaps.

In contrast to the World Bank’s model that incorporates three inter-related gaps, the T-H model is focused exclusively on one gap: the balance of payments constraint. The T-H model has no explicit savings-investment gap, which is given in equation (1) above. Neither does the T-H model contain a fiscal gap. In the T-H model, therefore, one has to assume that the savings-investment gap and the fiscal gap are actually implicit. To claim that the T-H model is indeed an “alternative” in the context under consideration, it is necessary to explicitly show how the balance of payments constrained growth is related to the investment-savings gap and the fiscal gap. As can be seen from the World Bank’s model, this can be done only in a consistent accounting framework that is based on behavioral relations explaining aggregate growth, savings and investment that are consistent with the balance of payments (or vice-versa) and the fiscal variables. The essence of Easterly’s criticism was that the Harrod-Domar based simple investment/growth behavioral relation assumed in the World Bank model was neither theoretically satisfying nor empirically valid, especially in the short-run. Easterly was well disposed to make that statement as he had substantially contributed to the evolution of the current form of the World Bank’s model. Sweeping this problem under the carpet

in the T-H model is not a satisfactory solution as the savings-investment gap and the fiscal gap cannot disappear into thin air.

The T-H estimate of foreign exchange requirements to achieve a given target rate of growth (see, his equations 8 and 9) is only a partial representation of the total foreign exchange needs of a country. Considering the more comprehensive balance of payments account given in equation (2) above, it is clear that the T-H model does not explicitly show the foreign exchange requirements relating to the maintenance of a desired (or target) level of foreign reserves (dRES), which is a very important variable in a policy dialogue. It is possible to argue that the change in reserves is somehow embedded in the two parameters of the T-H model relating to the proportions of the total import bill financed by export earnings and capital flows. If this is the case, it is a somewhat confusing way to take account of this factor and is bound to cause problems in practical implementation of the T-H model. The desired or target level of net foreign assets is a key element of the IMF financial programming framework, which is underpinned by the monetary model of the balance of payments. Maintaining an adequate level of foreign assets to meet import payments is a crucial foreign exchange requirement facing many developing countries. Thus, the foreign financing gap estimate of the T-H model is only a partial estimate of requirements as it fails to account for the total foreign exchange requirements of a country, including the need to build up external reserves.

Considering the T-H model in the context of explaining growth rate differences by demand constraints associated with the balance of payments, Elliot and Rhodd (1999)

came to the conclusion that the T-H model “to be less than complete because it omitted the effect of debt servicing.” Elliot and Rhodd demonstrated that the simple Harrod multiplier will over-predict growth if the rate of change in debt servicing is greater than the rate of capital inflows, and the model will under-predict if the rate of capital inflows is greater than the rate of change in debt servicing.

Furthermore, an important shortcoming of the T-H model is that it fails to trace the monetary implications of the balance of payments outcomes, which is at the heart of the IMF’s financial programming framework. The Fund’s framework integrates monetary, income and balance of payments analysis, and is also the basis for credit allocation to member countries (see, Polak (1997), Khan and Montiel (1989), Khan, Montiel, and Haque (1990), Bolnick (1999), IMF(1977), IMF(1987)). Unlike the T-H model, the World Bank’s “standard” model is roughly comparable to the IMF’s financial programming framework as both these models are built on the same accounting framework. More importantly, both the Fund and Bank models explicitly address the important policy problem of maintaining a target level of foreign exchange reserves and the implications of that target to the monetary/credit variables in the given country. The monetary model of the balance of payments is the theoretical underpinning of the domestic credit ceilings (especially the credit to government sector) that are part of IMF conditionality. Unfortunately, the T-H model does not address these questions explicitly.

Practical applications of models in macroeconomic policy work

Why the macroeconomic framework needs to be explicitly treated in an integrated manner can also be considered from a very practical point of view. In their work, donors, policy makers at country level, and country economists at international organizations have to be concerned with an integrated view of macroeconomic developments. That is, they consider the three gaps (the savings-investment, the foreign exchange and the fiscal balance) in a consistent manner. All the parties in a policy dialogue demand to see the basic information regarding growth, inflation, the balance of payments, the fiscal gap, the external debt indicators (the standard external exposure indicators as well as details about concessionary financing availabilities etc). Even if the T-H model is used, it would be necessary to present the implications of a macroeconomic scenario in terms of all three gaps. More specifically, it would be necessary to translate the growth and financing gap arrived at by T-H to their private and public components of investment and savings. This is particularly important for tracing the implications of a balance of payments outcome on the public investment and budgetary financing situation of the country under consideration. This is a point missed by both Hussain and Easterly. In Hussain's case, it results in a mistaken claim that he has found an "alternative" model. Ignoring this real life process makes the T-H model more of an academic exercise.

In Easterly's case, it appears that he was carried away by the lack of rigor in the Harrod-Domar specification that underlies the World Bank's model and he missed the importance of the procedure that leads to the identification of the so-called "financing

gap.” The World Bank’s model is not a rigorous tool, but rather a “back of envelope” calculation (as Easterly mentioned) that enables a dialogue among different partners: the country-specific policy makers, the country economists in the World Bank and/or IMF, and the donor countries’ representatives. The World Bank’s and/or the IMF’s models and projections provide a consistent framework within which a meaningful dialogue on the growth, inflation, balance of payments, and fiscal implications of several external sector developments and policy scenarios can be carried out. One such important instance is the Special Program for Africa (SPA) where the “financing gap” is a crucial indicator for the dialogue between the donors and the country officials. Another is the Country Assistance Strategy (CAS) of the World Bank. As mentioned before, a large volume of information is utilized to draw up “high”, “most reasonable” and “low” case scenarios, which are presented for consideration. In identifying the relevant “financing gaps”, country economists are not solely guided by the Harrod-Domar model as Easterly would want us to believe (Easterly (1999)). As mentioned before, they take into account a large number of factors such as possibly lumpy investments, productivity, and emerging opportunities for export-diversification etc.. The resulting growth model, however, may be cast in the Harrod-Domar framework, more as a convenient way to summarize the scenarios and results than to be “dogmatic”. In his quest of rigor, Easterly seems to have overlooked this procedural aspect, which actually, in a sense, does not rely that much on the formal Harrod-Domar specification of growth.¹⁰ In this sense, it is hard to see where the “ghost” is in the “financing gap.”

¹⁰ For a very pragmatic description of the use of the financial programming model of the IMF for stabilization policy, see Mussa and Savastano (1999).

As pointed out above, ignoring the savings-investment relation within the framework under consideration has resulted in the T-H model taking an incomplete view of the interrelations under consideration. Thus, the T-H model has not only failed to address the investment-savings gap issue treated by Easterly but also has grossly underestimated the importance of the iterative procedure that is used in the World Bank and related organizations to arrive at “financing gaps.” This iterative procedure essentially concerns the identification of balance of payments financing requirements and fiscal deficits that are mutually consistent in the “three gap” framework shown above.

Referring to the savings-investment gap, Hussain states that “...measuring the resource gap as the difference between planned investment and planned savings does not mean that capital inflows to fill the gap will automatically be invested or that they are predestined for investment. The T-H approach does not imply such presumptions.” Neither do the World Bank/IMF models or their country economic work carry such presumptions. Besides, the World Bank and the IMF, after 50 years of experience, do not seem to carry any illusions about the implementation capacities in member countries. The question here is not so much about presumptions as about practical implications of capital inflows to finance public and private investment. In the World Bank/IMF frameworks, the relative magnitudes of resource flows have an important bearing on both the time path and the nature of the policy package that is designed for implementation. When shortfalls in implementation occur, the targets for resource flows as well as implementation schedules are revised. Given this iterative process of aid-related work at

the international financial institutions, it is hard to believe Easterly's assertion that these institutions assume that "aid will go into investment one for one" (Easterly, 1999).

One important consideration worth mentioning in the policy dialogue in programs such as the SPA is the explicit treatment of the external indebtedness of a country. The external debt module (DM) attached to the "standard" models facilitates this analysis. External loan disbursements, repayments, and interest payments are considered from the point of view of donors as well as receivers. The donors are classified according to multilateral, bilateral, private-guaranteed, and private non-guaranteed while the borrowers are categorized by central government, monetary sector, or private sector (including public sector organizations). This enables a reasonably accurate mapping of resource supply and identification of specific resource needs within say a medium-term adjustment framework under consideration. As such, "financing" gaps are not just a matter of an estimate based on investment demand determined by an incremental-output ratio. Rather, they are the result of a common-sense dialogue, which takes into account all possible information available on expected external and domestic developments, the emerging resource needs and available finance.

Given the pragmatic way the World Bank/IMF models have been used in the recent past as tools for a policy dialogue with member countries, it is somewhat inappropriate to state that these models are used to "prescribe policies" for developing member countries (see Hussain, 2001). It is equally inaccurate to say that these models

are used to “make growth projections...” Rather, the models are used essentially to explore resource implications of different macroeconomic scenarios.

These points have been brought into focus by Mussa and Savastano (1999) when they analyzed the IMF experience with stabilization programs. They observe that: “... the intellectual doctrine associated with IMF financial programming is primarily a recognition of basic accounting identities supplemented with a small number of behavioral relationships and forecasts of key economic variables, the latter two being subject to revision as new evidence becomes available. This is topped with a reasonable discretion in judging both the size of the required macroeconomic adjustment and the relative effectiveness of the policy instruments available to the authorities to undertake it.”

Data and Estimation Issues

Comparing the T-H and the Harrod-Domar models, Hussain refers to the problems of estimating the parameters and the “inaccuracy of the ICOR approach in measuring the financing gap and in predicting growth performances.” He claims that “in contrast, the basic parameters of the T-H approach are the price and income elasticities of demand for exports and imports.....these elasticities.....are, therefore, fairly constant and largely exogenous, and hence more reliable to use for predictive purposes.”

Economists at the country level and in international organizations are well aware of the difficulties associated with economic data. There is no empirical evidence to show that

trade data in developing countries are in anyway “better” or more “reliable” than investment or consumption data. Furthermore, Bairam and Ng (2001) who investigated the stability of export and income elasticities embodied in the T-H model found that the export and import demand functions for Canada and UK were unstable during the period 1973-95. The sample of countries studied by Bairam and Ng included Canada, New Zealand, and the UK, where statistics are better developed than in most developing countries. Thus, there seems to be no guarantee of the stability of the elasticities in question for most of the developing countries. If these parameters are not stable the, T-H model is bound to yield biased results.

Concluding remarks.

The brief examination of the World Bank and the T-H models reveals that the latter is a somewhat of a partial representation of the former. The T-H model lays emphasis on the balance of payments constraint only and has not taken into explicit consideration the aggregative saving-investment behavior that is implicit in the balance of payments picture. Thus, the exposition has missed the important point made by Easterly regarding the theoretical and empirical weaknesses of the investment/growth relationship underlying the World Bank model. Both Easterly and Hussain, however, fail to realize the practical ways in which these theoretical and empirical weaknesses are overcome in practical applications of these models. The World Bank’s model is only a starting point of a policy dialogue between donors and developing countries that

eventually converges to agreements on the magnitude and time path of resource flows. In this sense, both Easterly and Hussain seem to be chasing after non-existing “ghosts”.

It may be pertinent to quote what Paul Krugman said recently (Krugman, 2000) when he considered the question how complicated a model has to be:

“ ... what we know pretty well, from decades of trying to give micro-foundations to macro, is that logical completeness and intellectual satisfaction are not necessarily indications that a model will actually do a better job of tracking what really happens. For many purposes, the small, ad-hoc models are as good as or better than the carefully specified, maximizing intertemporal model.”

Considering Krugman’s observation, although made in another context, and what Mussa and Savastano have said about the pragmatic use of IMF’ financial programming model, one might be tempted to conclude that the “ghost of the financing gap” after all may not be a bad ghost to live with, until a credible alternative is found.

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Appendix 1.
Symbols used.

Y	-	Gross domestic product at market prices
C	-	Total consumption
I	-	Gross domestic fixed capital formation (investment)
X	-	Export of goods and services
IM	-	Imports of goods and services.
NFY	-	Net factor income
NCT	-	Net current transfers
KT _{fg}	-	Capital transfers to government from abroad
DFI	-	Direct foreign investment
POR	-	Portfolio investment
NLT	-	Net long-term borrowing
NST	-	Net short-term borrowing
dRES	-	Change in external reserves
GAPF	-	Financing requirements for closing the balance of payments gap. ¹¹
Td	-	Direct taxes
Ti	-	Indirect taxes
Sub	-	Subsidies
NCTfg	-	Net foreign current transfers to government
NTXpg	-	Non-tax revenue of government
NFfg	-	Net foreign factor payments by government
NCTgp	-	Net current transfers from government to private sector

¹¹ For simplicity, government and private sectors flows have been aggregated to show NFY,NCT,NLT,NST on a net basis. Note also that the flow-of-funds matrix in table 2 contain more details than shown in the equations in the text.

NFgp	-	Net factor payments by government to private sector
NFgm	-	Net factor payments by government to monetary sector
Cg	-	Government consumption
Krev	-	Capital revenue
Ig	-	Government investment
NKTRgp-		Net private capital transfers of government
Lmg	-	Government sector borrowing from the monetary sector
NLTfg	-	Net long-term borrowing from abroad
NSTfg	-	Net short-term borrowing from abroad
KTfg	-	Net foreign capital transfers
Lpg	-	Net government borrowing from the private sector.
Lmp	-	Private sector borrowing from the monetary sector: i.e. change in the stock of domestic credit to the private sector (DC_p)
Lmg	-	Government sector borrowing from the monetary sector: i.e. change in the stock of domestic credit to the government sector (DC_g)
dNOL	-	Change in net other liabilities of the monetary system
M	-	Broad money (M2)
dM	-	Change in broad money stock
P	-	Price level
y	-	Real GDP at market prices
v	-	Velocity of circulation of broad money.
ICOR	-	Incremental capital-output ratio
c	-	Propensity to consume

NCTR	-	Net current transfers in real terms ¹² received by the rest of the economy from the other sectors ¹³
Imi	-	Demand for ith import category; ¹⁴
RERi	-	Real exchange rate for the ith import category. ¹⁵
Xm	-	Exports of manufacturing goods
Yf	-	Trading partners income level
RERm	-	Real exchange rate for manufactures.
Gxi	-	exogenously given growth rate of export category i.

¹² If a component specific deflator of net current transfers is not available the deflator used to deflate the specific item in net current transfers is the domestic absorption deflator.

¹³ An example of transfers that contribute to a person's net disposable income is worker's remittances from abroad and pension payments by the government.

¹⁴ The import components identified in the model are: food, consumer goods, intermediate raw materials, intermediate manufactured, capital goods and fuel and other petroleum based products.

¹⁵ In the linear form of the specific functions used, the user specifies the elasticities of demand with respect to income (y) and the real exchange rate (RER).

Appendix 2: Illustrative Flow-of-Funds Matrix (World Bank Model)

Current Account	Government	Monetary	Rest of Economy	Rest of World	National Accounts	Totals
Government			Td NTXpg	CTfg	Ti -Sub	
Monetary	Ngm		Npm	Nfm		
Rest of Economy	Ngp CTgp	Nmp		Nfp PROFfp WRfp CTfp	Yfc	
Rest of World	CTgf Ngf	Nmf	Npf PROFpf CTpf		IM -X	
National Accounts	Cg Sg		Cp Sp	Sf		
Totals						

Capital Account	Government	Monetary	Rest of Economy	Rest of World	National Accounts	Totals
Government		Lmg	KRev Lpg	Lfg KTfg	Sg	
Monetary			MQM NOL			
Rest of Economy	Lgp	Lmp		Lfp DFIL PORLeq PORLde NSTfp CapNEI CapE&O	Sp	
Rest of World		NFAma NFAdmb	DFIA PORAeq PORAde Lpf		Sf	
National Accounts	lg		lp			
Totals						

Equations of the Thirlwall-Hussain Model (using T-H equation numbers)

$$m = \varepsilon(p_f - e - p_d) + \pi y \quad (2)$$

$$x = \beta(p_d + e - p_f) + \sigma w \quad (3)$$

$$\Theta(p_d + e + x) + \tau k = p_f + m \quad (4)$$

$$y = \frac{(1 + \Theta\beta + \varepsilon)(p_d + e - p_f) + \Theta\sigma w + \tau(k - p_d - e)}{\pi} \quad (5)$$

$$y = \frac{(1 + \varepsilon)(p_d + e - p_f) + \Theta x + \tau(k - p_d - e)}{\pi} \quad (6)$$

$$y = \frac{\sigma w}{\pi} \text{ or } \frac{x}{\pi} \quad (7)$$

$$k^* = \frac{\pi y^* - (1 + \Theta\beta + \varepsilon)(p_d + e - p_f) - \Theta\sigma w}{(1 - \Theta)} + (p_d + e) \quad (8)$$

$$k^* = \frac{\pi y^* - (1 + \varepsilon)(p_d + e - p_f) - \Theta x}{(1 - \Theta)} + (p_d + e) \quad (9)$$

- m = rate of growth of real imports
 x = rate of growth of real exports
 y = rate of growth of real income
 w = rate of growth of world income
 p_f = rate of change in the foreign price of imports
 p_d = rate of change in domestic prices
 k = rate of change in nominal capital inflows
 e = rate of change in the exchange rate measured as the foreign price of domestic currency
 ε = price elasticity of demand for imports ($\varepsilon < 0$)
 β = price elasticity of demand for exports ($\beta < 0$)
 π = income elasticity of demand for imports ($\pi > 0$)
 σ = income elasticity of demand for exports ($\sigma > 0$)

- Θ = proportion of the total import bill “financed” by export earnings
- τ = proportion of the total import bill “financed” by capital flows
- y^* = target growth rate
- k^* = rate of growth of nominal capital inflows (measured in foreign currency)
required to achieve the target growth rate y^*